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Inorganic Halides Final Work Plan Registration Review September 2009

Inorganic Halides
Registration Review Case 4051
Final Work Plan
September 2009

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I. FINAL WORK PLAN

Introduction

This is the Environmental Protection Agency's (EPA or "the Agency") *Final Work Plan* (FWP) for the registration review of the inorganic halides (Case 4051). The work plan includes the expected registration review time line. The FWP also addresses public comments received concerning the *Preliminary Work Plan* (PWP) in the *Summary Document*, which was posted in the inorganic halides registration review docket (EPA-HQ-OPP-2009-0168), and any other comments concerning initial docket postings. The *Summary Document* provided information on what EPA knows about the pesticides and what additional risk analyses and data or information the Agency believes are needed to make a registration review decision.

The Agency is implementing the registration review program pursuant to Section 3(g) of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and will review each registered pesticide every 15 years to determine whether it continues to meet the FIFRA standard for registration. The Agency will consider benefits information and data as required by FIFRA. Changes in science, public policy and pesticide use practices will occur over time. The registration review program is intended to make sure that, as the ability to assess risk evolves and as policies and practices change, all registered pesticides continue to meet that statutory standard. The public phase of registration review begins when the initial docket is opened for each case. Information on this program is provided at: http://www.epa.gov/oppsrrd1/registration_review/.

Comments Received on the Preliminary Work Plan

In the Preliminary Work Plan (PWP), the EPA solicited comments on three specific topics: environmental justice, water body impairment and potential trade irritants. No comments or information were received during the public comment period concerning these issues.

During the public comment period, the EPA received several comments as described and discussed below. The comments received during the initial public comment period did not affect the data needs, work plan and timeline described in the PWP and they remain as they were presented initially in the PWP. Further, this document makes final the work plan for the inorganic halides registration review process.

Comment: The American Chemistry Council Brominated Biocides Task Force commented on the Inorganic Halides Preliminary Work Plan (PWP). In their comments the Task Force expressed a concern for how the Agency may evaluate the formation of bromate resulting from the use of sodium bromide in swimming pools. The Task Force stated that they have previously submitted information to the Agency regarding the formation of bromate in swimming pools treated with bromine-based registered products and that they had previously submitted a risk assessment of bromate exposure to swimmers. The Task Force has concerns about the methods and assumptions used in EPA's 2005 bromate cancer risk assessment, entitled the *Formation of Bromate Ion from Application of Dihalodialkylhydantoin Sanitizers (BCDMH and DBDMH) into Swimming Pools and Associated Cancer Risk for Swimmers*, DP Barcode 324327, dated

December 22, 2005 and would like to discuss the assessment with the Agency and the possible need for any new data on bromate in developing a refined risk assessment in support of registration review.

Response: The Agency appreciates the comments provided by the American Chemistry Council (ACC) on previous bromate risk assessments. The Agency is open to discuss with the ACC any concerns that they may have regarding the existing risk assessments and data needs. The objective of the inorganic halides Preliminary Work Plan (PWP) was to review the hazard and exposure databases for the inorganic halides and to determine whether changes in science policy or deficiencies in the databases materially affected the overall risk picture. Existing Agency records indicate that the Agency previously had concerns regarding the bromate concentration swimming pool data submitted by industry and that the Agency believed these data to be insufficient. These Agency concerns and subsequent bromate data deficiencies are summarized in the inorganic halides PWP and reflect those concerns which were identified in EPA's 2005 BCDMH and DBDMH assessment entitled, the *Formation of Bromate Ion from Application of Dihalodialkylhydantoin Sanitizers (BCDMH and DBDMH) into Swimming Pools and Associated Cancer Risk for Swimmers, DP Barcode 32432*, (12/22/2005). The Agency will consider any new data submissions during the registration review process. Examples of such submissions include but are not limited to the following: information or data which may upgrade or refine data deficiencies in the existing pool water studies; and submission of data that the Agency anticipates needing, as has been identified within the inorganic halides PWP and FWP (e.g., exposure data). The Agency will conduct new risk assessments to assess possible bromate exposure as a result of the use of sodium bromide to treat swimming pools when it has received, reviewed and accepted the appropriate guideline study submissions.

The following comments were submitted by the registrant Albermarle Corporation:

Comment: Section II Fact Sheet of the Preliminary Work Plan (page 15) lists only three registrants. These companies are a carry-over from the Bromine Preliminary Work Plan. This needs to be revised to list the companies on page 18-21.

Response: The Agency had inadvertently included an incorrect list of registrants in the Inorganic Halides Preliminary Work Plan (PWP) Fact Sheet (Section II). The Agency has corrected this error by amending the Fact Sheet to include the correct list of Technical Registrants for the registered inorganic halides products. The revised inorganic halides Fact Sheet has been included in this Final Work Plan.

Comment: Albemarle cancelled 4 product registration identified in Table 3 (page 19) of the Preliminary Work Plan. The cancellations were effective April 1, 2009 for EPA Reg. Nos. 3377-53, 3377-54, 3377-76, and 3377-77. These registrations should be removed from Table 3 and Appendix A (page 52 and 53). They should also be removed from the Summary of Product Chemistry, Environmental Fate, and Ecotoxicity Data document (page 11).

Response: The *Summary of Product Chemistry, Environmental; Fate, and Ecotoxicity Data for the Inorganic Halides Registration Review Decision Document* has been revised to no longer include mention of the following product registrations which have been cancelled: EPA Reg. Nos. 3377-53, 3377-54, 3377-76, and 3377-77. The Final Work Plan and Appendix A for inorganic halides also reflect this change and these documents do not mention these products as they have been cancelled and therefore, are not subject to registration review.

Comment: Appendix A of the Preliminary Work Plan has an error on page 51. EPA Reg. No. 3377-44 should be removed from the swimming pool water systems, hot tubs, spas and fountains.

Response: EPA Reg. No. 3377-44 was inadvertently included in the Appendix A of the Inorganic Halides Preliminary Work Plan. EPA Reg. No. 3377-44 does not contain sodium bromide (or any of the other inorganic halides) as an active ingredient, as is indicated in the Preliminary Work Plan (PWP). Therefore, the Agency has revised the Appendix A and deleted EPA Reg. No. 3377-44 from the Inorganic Halides Appendix A. This revision is reflected within the Appendix A of the Inorganic Halides Final Work Plan (FWP).

Risk Assessment and Data Needs

The use of sodium bromide to treat swimming pools can result in the formation of bromate ion. Bromate has been recognized as inducing systemic adverse effects and has been identified by the Agency as a probable human carcinogen. Therefore, the Agency anticipates that additional data are needed on the formation of bromate ion in swimming pool water; and will conduct updated occupational and residential assessments to assess possible exposure to bromate ion resulting from the use of sodium bromide in swimming pools. Also, the Agency will conduct an ecological risk assessment and expects to require non-target plant toxicity data to support the once-through industrial water systems use of sodium bromide. These anticipated data and risk assessments are needed to complete this registration review.

The inorganic halides registration review case consists of the following three active ingredients: magnesium chloride (PC code 0013902), sodium chloride (PC code 013905) and sodium bromide (PC code 013907). Note that there are 14 registered products containing various halogen sources, an oxidizing agent, and sulfamic acid; ten of these are currently labeled as containing sodium bromide or sodium chloride as an active ingredient. It is very likely that the actual halogen-bearing active ingredients in these products are bromosulfamate and/or chlorosulfamate salts. The Agency will pursue the correct identification of the active ingredients during Registration Review. The Agency is interested in establishing consistent labeling that is meaningful to the affected user industries.

Magnesium chloride is registered for agricultural use only (no antimicrobial uses) as a herbicide for selective weed control of all types of ice plant (newly planted or established). Sodium chloride is registered as a disinfectant, sanitizer (non-food contact surface), bactericide,

fungicide, virucide and algaecide when mixed in low concentrations (1.5% a.i.) with other active ingredients (e.g., potassium peroxymonosulfate, sodium dichloroisocyanurate dehydrate). Sodium chloride use sites include hard non-porous surfaces in institutional, commercial, residential, food processing and public service facilities, and industrial, animal and agricultural facilities. Sodium bromide is registered as a water disinfectant, sanitizer, slimicide, bactericide, algaecide, fungicide, and molluscicide. Sodium bromide use sites include aquatic non-food industrial sites (e.g., commercial and industrial re-circulating water-cooling systems, wastewater treatment, industrial once-through water cooling systems, pulp and paper mill water systems); aquatic non-food residential sites (e.g., ornamental ponds/aquaria, swimming pool water systems, domestic/commercial non-potable water); indoor food sites (e.g., food processing water systems), and indoor non-food sites (e.g., pasteurizer/ warmer/cannery cooling water systems).

Currently there is one EPA registered product containing magnesium chloride as an active ingredient; 2 registered products containing sodium chloride as an active ingredient; and 74 registered products containing sodium bromide as an active ingredient. The inorganic halides are also listed as inert ingredients in currently registered products (285 products containing magnesium chloride as an inert ingredient; 1,399 products containing sodium chloride as an inert ingredient; and 44 products containing sodium bromide as an inert ingredient). Magnesium chloride and sodium bromide are both classified as list 4B inert ingredients and sodium chloride is classified as a list 4A inert ingredient based on minimal risk and low concern for potential human health and or environmental effects. Also, magnesium chloride and sodium chloride are generally recognized as safe (GRAS) (21 CFR §184.1426) by the U.S. Food and Drug Administration (FDA).

It should be noted that sodium bromide dissociates completely to sodium and bromide ions when it is added to water. Activators such as chlorine and sodium hypochlorite react with the dissociated bromide ion to form hypobromous acid (HOBr). In aqueous environments (e.g., swimming pools) and in the presence of sunlight, oxidizing agents and/or alkaline conditions, bromide dissociates to form bromate ion. Unlike the other bromine residues, bromate ion is considered to be of toxicological concern and has been classified by the Agency as a probable human carcinogen (U.S. EPA, *Guidelines for Carcinogen Risk Assessment*, 1986). Based on sodium bromide's current use patterns (e.g., treat swimming pools), sodium bromide products are expected to generate bromate ion.

On a case-by-case basis, the Agency may determine that activators or other substances that are not part of the pesticide formulation need to be registered as a pesticide under FIFRA. This determination will depend on, among other things, the following: the nature of chemical reactions that take place between the active ingredient and the activator or other compound; the ways in which the activator or other compound is distributed, sold and why; and the use site, location and/or other circumstances or ways where or when mixing of the activator or other compound and the pesticide formulation occurs.

Bromate

It is believed that bromate ion (BrO_3^-) will rarely, if ever, form in nature. Bromate ion is expected to form, however, during such anthropogenic activities as chlorination of outdoor pools, oxidation of bromide (Br^-) during ozonation of drinking water, or use of a bromochlorohydrantoin for sanitization. For example, under those conditions listed above, sodium bromide, when used to treat outdoor swimming pools, can form bromate ion.

Although this particular registration review case addresses sodium bromide, it should be noted that there are a number of additional antimicrobial pesticides that also release bromine/bromine residues (e.g., bromide, bromate). The EPA anticipates that an aggregate assessment will be needed to assess possible exposures to bromate resulting from the use of all bromine releasing chemicals that may generate bromate ion. Each of the registration review cases listed below have been identified as having bromine releasing chemicals that may generate bromate ion:

- Sodium bromide (NaBr) of the Inorganic halides Case. Registration Review Case 4051. P.C. Code 013907. CAS No. 7647-15-6. 2009 Docket. Use requires an oxidizer such as Cl_2 or NaClO . 2009 Docket. EPA-HQ-OPP-2009-0168
- Ammonium bromide (NH_4Br). Registration Review Case 5008. P.C. Code 000352. CAS No. 12124-97-9. 2012 Docket.
- 3-Bromo-1-chloro-5,5-dimethyl-2,4-imidazolidinedione (a hydantoin). Registration Review Case 5005. P.C. Code 006322. CAS No. 126-06-7. 2009 Docket.
- 1-Bromo-3-chloro-5,5-dimethyl-2,4-imidazolidinedione (a hydantoin). Registration Review Case 3055. P.C. Code 006315. CAS No. 16079-88-2. RED issued 9/30/04.
- 1,3-Dibromo-5,5-dimethyl-2,4-imidazolidinedione (a hydantoin). Registration Review Case 3055. P.C. Code 006317. CAS No. 77-48-5. RED issued 9/30/04.
- 1-Bromo-3-chloro-5-ethyl-5-methyl-2,4-imidazolidinedione (a hydantoin). Registration Review Case 5101. P.C. Code 128989. CAS No. 91112-66-2.

The Agency anticipates that an aggregate assessment will be needed to assess exposures to bromate ion derived from each of the antimicrobial cases listed above. Exposures to bromate ion and concomitant risks associated with the registered uses of chemicals in each case identified above will be assessed individually during the risk assessment stage of registration review for each case. Upon completion of the risk assessment stages of all antimicrobial pesticides generating bromate ion, the exposures to bromate ion derived from each of these antimicrobial cases will be aggregated with any other known sources, if co-exposure is determined to be likely. It is also anticipated that quantitative assessments of human exposure and possible cancer risks will be needed for all bromine-releasing antimicrobial chemicals that generate bromate ion.

For further information regarding the bromine releasing chemicals please refer to the *Bromine. Human Health Effects Scoping Document for the Registration Review Decision*. PC Code: 008701, dated March 10, 2009 and the *Summary of Human Health Effects Data for the Inorganic Halides Registration Review Decision Document*, dated March 18, 2009.

Human Health Risk Assessment Status

For a detailed discussion of the anticipated human health exposure and risk assessment needs, please refer to the *Summary of Human Health Effects Data for the Inorganic Halides Registration Review Decision Document*, dated March 18, 2009.

A Reregistration Eligibility Decision (RED) for the inorganic halides was issued in 1993, and a Tolerance Reassessment Eligibility Decision (TRED) for bromine was issued in September of 2005. The 2005 bromine TRED includes risk assessments for the use of sodium bromide as a food contact sanitizer. These documents can be located at: <http://www.epa.gov/pesticides/reregistration/status.htm>

The Agency has reviewed all available information and data regarding the inorganic halides. Based on the low toxicity of magnesium chloride, sodium chloride and sodium bromide (the inorganic halides), the Agency currently anticipates that no additional toxicity and exposure data will be needed for the parent active ingredients in the inorganic halides registration review case. In addition, the Agency does not anticipate that any further occupational or residential handler assessments will be needed for these three parent active ingredients. However, based on sodium bromide's current use patterns (e.g., treatment of swimming pools), sodium bromide products are expected to generate bromate ion. Bromate has been recognized as inducing systemic adverse effects and has been identified by the Agency as a probable human carcinogen (U.S. EPA, *Guidelines for Carcinogen Risk Assessment*, 1986). Therefore, the Agency anticipates that additional data will be needed on the formation of bromate ion in swimming pool water; and updated occupational and residential assessments will assess possible exposure to bromate ion from the use of sodium bromide in swimming pools. Upon completion of the risk assessment stages of all antimicrobials generating bromate ion, the exposures to bromate ion derived from each of these antimicrobial cases will be aggregated with any other known sources, if co-exposure is determined to be likely. This information will be needed to ensure that the inorganic halides registration review case meets the safety standards established by FIFRA and FFDCa, as amended by FQPA.

Toxicity

Magnesium chloride can be extracted from brine or sea water and is abundant in nature. Magnesium chloride is generally recognized as safe (GRAS) (21 CFR §184.1426) by the U.S. Food and Drug Administration (FDA). In water, magnesium chloride dissociates completely into magnesium and chloride ions, which are both essential constituents of the body and are present in many foods. Magnesium chloride has minimal acute toxicological effects (toxicity category IV) for acute oral, inhalation, dermal and eye irritation and dermal sensitization. Therefore, the Agency does believe that further toxicity data or exposure assessments for magnesium chloride will be needed in association with this registration review.

Sodium chloride (commonly known as salt, sea salt and table salt) is abundant in nature and is commonly used to season or preserve food. Sodium chloride is generally recognized as safe (GRAS) (21 CFR §184.1426) by the U.S. Food and Drug Administration (FDA). Sodium chloride is an essential constituent of the body, present in many foods, and in water dissociates

completely in to sodium and chloride ions. Therefore, the Agency does not believe that further toxicity data or exposure assessments for sodium chloride will be needed in association with this registration review.

Sodium bromide and bromide have no toxicological differences and, therefore, the Agency has relied on the bromide acute toxicity database for sodium bromide. No adverse systemic effects have been associated with sodium bromide based on an evaluation of the bromide hazard database. Therefore, toxicity endpoints were not selected. Based on its residential and dietary uses, risk assessments were conducted for sodium bromide in support of the 2005 bromine TRED. No risks of concern were identified. Therefore, it is anticipated that further toxicity data and exposure assessments for the parent sodium bromide will not be needed in association with this registration review.

As previously mentioned, based on sodium bromide's current use patterns (e.g., treatment of swimming pools), sodium bromide products are expected to generate bromate ion. Bromate ion is expected to form during such anthropogenic activities as chlorination of outdoor pools, oxidation of bromide (Br^-) during ozonation of drinking water, or use of a bromochlorohydantoin for sanitization. For example, under those conditions listed above, sodium bromide, when used to treat outdoor swimming pools, can form bromate ion. Bromate has been recognized as inducing systemic adverse effects and has been identified by the Agency as a probable human carcinogen (U.S. EPA, *Guidelines for Carcinogen Risk Assessment*, 1986). Therefore, the Agency anticipates that additional data are needed on the formation of bromate ion in swimming pool water; and that updated occupational and residential assessments will be needed to assess possible exposure to bromate from the use of sodium bromide in swimming pools. Upon completion of the risk assessment stages of all antimicrobials generating bromate ion, the exposures to bromate ion derived from each of these antimicrobial cases will be aggregated with any other known sources, if co-exposure is determined to be likely.

Dietary and Drinking Water Assessment

Based on their low toxicity, minimal exposure, and low concentrations in registered products dietary and drinking water exposures and risks of concern are not anticipated for magnesium chloride and sodium chloride. Therefore, dietary and drinking water assessments are not anticipated as being needed for magnesium chloride and sodium chloride in support of this registration review. Additionally, magnesium chloride and sodium chloride are generally recognized as safe (GRAS) [21 CFR §184.1426] by the U.S. Food and Drug Administration (FDA). A tolerance exemption has been established for residues of magnesium chloride when used as a safener in accordance with good agricultural practices as an inert or occasionally an active ingredient in pesticide formulations that are applied to growing crops or to raw agricultural commodities after harvest [40 CFR 180.1001 (c)].

A tolerance exemption has also been established for sodium bromide. This tolerance exemption indicates that when used for ready to use food contact sanitizing solutions, the end-use concentration of sodium bromide in the solution is not to exceed 200 ppm total available halogen [40 CFR 180.940 (c)]. In the 2005 bromine TRED, EPA developed a risk assessment to reassess possible dietary and drinking water risks of concern for the use of sodium bromide as a

food contact sanitizer. The Agency concluded that sodium bromide has low toxicity via any route of exposure and that use of sodium bromide is unlikely to pose a significant hazard to the general public or any population subgroup. Therefore, dietary and drinking water assessments are not anticipated as being needed for parent compound sodium bromide in support of this registration review.

EPA's Office of Water has established a Maximum Contaminant Level (MCL) for residual bromate ion, the only sodium bromide residue currently of human health concern, in drinking water at 10 µg/L (0.01 ppm). This MCL represents all sources of residual bromate ion in drinking water whether they are naturally-occurring/background sources or anthropogenic (including pesticidal). Sodium bromide dissociates completely to sodium and bromide ions when it is added to water. In aqueous environments and in the presence of sunlight, oxidizing agents and/or alkaline conditions, bromide is repeatedly oxidized to form bromate ion.

Based on sodium bromide's current use patterns (e.g., treatment of swimming pools) sodium bromide products are expected to generate bromate ion. However, the registered uses of sodium bromide are not expected to contribute measurably to the aggregate human exposure to bromate ion in drinking water. Trace amounts of bromate ion could form under certain conditions from the use of sodium bromide (e.g., in the presence of sunlight, oxidizing agents and/or alkaline conditions, bromide is repeatedly oxidized to form bromate ion). However, this highly oxidized form of sodium bromide (bromate ion) is not expected to survive in the environment long enough for water, from these limited-outdoor uses and commercial/industrial discharges, to reach potable water sources. Virtually all sodium bromide residues in the environment (including raw water) will exist as sodium (Na⁺) and bromide (Br⁻) as a result of the dissociation of sodium bromide (NaBr) and by oxidation of organic matter (including microbes) by the oxidized sodium bromide species. The amount of bromide (Br⁻) in water contributed by the use of sodium bromide is not expected to be distinguishable from the background, naturally-occurring levels of bromide. Therefore, there is no need to quantify any dietary or drinking water exposure to bromate ion that may result from the introduction of sodium bromide residues into the environment. The oxidation of naturally-occurring bromide ion during drinking water ozonation is likely to produce virtually all bromate ions to which humans may be exposed. Therefore, the use of sodium bromide will not further impact possible human exposure to bromate ion and a dietary (food and drinking water) assessment is not anticipated for sodium bromide. However, if new data received by the Agency indicate a potential drinking water concern, an assessment will be conducted.

Aggregate and Cumulative Exposure

In examining aggregate exposure, EPA takes into account the available and reliable information concerning exposures to pesticide residues in food and drinking water, and non-occupational pesticide exposures. Of the three inorganic halides (magnesium chloride, sodium chloride and sodium bromide), the only toxicological concern is from the breakdown product bromate ion, which may form in the water after sodium bromide is added to outdoor swimming pools. Magnesium chloride and sodium chloride do not produce bromate ion and are recognized by the Food and Drug Administration (FDA) as GRAS for use in foods. Furthermore, there are no toxicological endpoints of concern for the parent compounds sodium bromide, magnesium

chloride and sodium chloride. In conclusion, EPA's database indicates limited evidence of any sub-chronic or chronic toxic effects through any route of exposure for magnesium chloride, sodium chloride and sodium bromide. As a result, no aggregate assessment is needed for these compounds.

As previously mentioned, along with sodium bromide there are a number of other antimicrobial pesticides that may also release bromate under specific use conditions. The EPA anticipates that an aggregate assessment will be needed to assess possible exposures to bromate resulting from the use of all bromine releasing chemicals that may generate bromate ion, including sodium bromide. Upon completion of the risk assessment stages of all antimicrobials generating bromate ion, the exposures to bromate ion derived from each of these antimicrobial cases will be aggregated with any other known sources, if co-exposure is determined to be likely.

At this time EPA has no evidence that magnesium chloride, sodium chloride and sodium bromide and breakdown products (bromate ion) have a common mechanism with other compounds. Therefore, a cumulative assessment will not be performed for any of these chemicals.

Residential and Occupational Assessments

An occupational and/or residential exposure assessment is required for an active ingredient if (1) certain toxicological criteria are triggered and (2) there is potential exposure to handlers (mixers, loaders, applicators, etc.) during use or to persons entering treated sites after application is complete. For magnesium chloride, sodium chloride and sodium bromide, these toxicological criteria are not triggered. Therefore, occupational and residential risk assessments are not required for the parent active ingredients magnesium chloride, sodium bromide and sodium chloride.

However, the Agency believes that a refined risk assessment will be needed to assess exposure to bromate ion. The Agency believes that under certain circumstances sodium bromide can oxidize to bromate, which is a carcinogen. However, the EPA has insufficient data to develop a trend on the conversion rate of sodium bromide to bromate ion. In 2005 the Agency conducted a risk assessment to evaluate possible exposure to bromate from use of sodium bromide to treat outdoor swimming pools. Although the Agency developed a risk assessment for bromate ion concentrations based on data submitted by industry, the EPA has concerns regarding the submitted data. Because the current data is considered to be insufficient, new data are believed to be needed to assess exposure to bromate in swimming pools. Therefore, the Agency anticipates that additional data regarding the concentrations of bromate in pool water, resulting from the use of sodium bromide, are needed to develop a new and refined risk assessment for the swimming pool use scenario. For further information please refer to the *Summary of Human Health Effects Data for the Inorganic Halides Registration Review Decision Document*, dated March 18, 2009.

Incidents

Thirty two incidents related to the use of sodium bromide have been reported in the OPP Incident Data System (IDS). Many of the incidents involve inadvertent dermal contact with sanitizer solutions; use of spa systems treated with sodium bromide products; and exposure resulting from mixing of product. Symptoms resulting from dermal exposure include rash, blisters, “popping” vesicles, and hives. Prolonged and/or direct exposure of the solution containing sodium bromide may cause severe, second degree chemical burns. It is known that sodium bromide may react with other chemicals in the treatment process. One incident reported serious lung damage for the applicator and death of a dog. This applicator was treating a swimming pool with a sodium bromide product in combination with other products. There are several incidents where workers feel dizziness, headache and difficult breathing while working in or near the treated structure.

Anticipated Human Health Data Needs

The Agency does not expect to require any further data for the parent magnesium chloride, sodium chloride or sodium bromide. However, the Agency anticipates requiring the following data for the degradation product bromate, resulting from the use of sodium bromide in swimming pools. For further information, please refer to the *Summary of Human Health Effects Data for the Inorganic Halides Registration Review Decision Document*, dated March 18, 2009.

Occupational and Residential Exposure Data Needs for Bromate

- (Special Study) Bromate Swimming Pool Water Concentrations
- (GLN 875.2700) Product Use Information
- (GLN 875.2900) Data Reporting and Calculations
- (GLN 875.3000) Non-dietary Ingestion Exposure

Anticipated Physical/ Chemical Property Data Needs

All product chemistry data requirements have been fulfilled for magnesium chloride, sodium chloride and sodium bromide. The Agency does not anticipate needing additional product chemistry data for these chemicals at this time. For further information please refer to the *Summary of Product Chemistry, Environmental Fate, and Ecotoxicity Data for the Inorganic Halides Registration Review Decision Document*, dated August 25, 2009.

Anticipated Environmental Fate Data and Ecological Risk Assessment Needs

For a detailed discussion of the anticipated environmental fate and ecological exposure and risk assessment needs, please refer to the *Summary of Product Chemistry, Environmental Fate, and Ecotoxicity Data for the Inorganic Halides Registration Review Decision Document*, dated August 25, 2009.

The Agency believes that environmental fate and ecological effects assessments and data will not be needed for magnesium chloride and sodium chloride. EPA has made a “No Effect” determination for endangered species for magnesium chloride and sodium chloride and further

environmental risk assessments will not be conducted unless public comments provide new information or data that warrant such assessment.

For sodium bromide, the Agency has not conducted a risk assessment that supports a complete endangered species determination. The ecological risk assessment planned during registration review will allow the Agency to determine whether sodium bromide's use has "no effect" or "may affect" federally listed threatened or endangered species (listed species) or their designated critical habitats. When an assessment concludes that a pesticide's use "may affect" a listed species or its designated critical habitat, the Agency will consult with the U.S. Fish and Wildlife Service and/or National Marine Fisheries Service (the Services), as appropriate.

Non-target plant toxicity data are anticipated as being needed for sodium bromide to conduct an environmental exposure risk assessment for the once-through industrial water systems use.

Magnesium Chloride

No quantitative risk assessment was performed for magnesium chloride. The Agency has conducted a review of the scientific databases and other relevant information in support of the registration of magnesium chloride. All environmental fate and ecological effects data requirements have been waived for this active ingredient. Magnesium chloride dissociates completely in water to magnesium cations (Mg^{++}) and chloride anions (Cl^{-}). Magnesium and chloride ions occur naturally in soils and waters and have no toxicological concern. It is not expected to contaminate ground water or soil and does not accumulate in the food chain. The information and data available to the Agency support the conclusion that the currently registered uses of magnesium chloride will not result in unreasonable adverse effects to the environment. Therefore, based on the low/non-toxicity and the lack of reported adverse effects information, the Agency does not anticipate conducting an environmental fate or ecological risk assessment for magnesium chloride. No additional data are needed.

Based on magnesium chloride's natural occurrence in the environment, common use as a food item, lack of reported adverse effects information, and very low/non-toxicity potential, the Agency has determined that the registered uses of magnesium chloride will have "no effect" (NE) on endangered or threatened terrestrial or aquatic species, or their designated critical habitats, as listed by the U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration (NOAA). As a result, no further risk assessment is anticipated unless new information warrants such action.

Sodium Chloride

Sodium chloride dissociates completely in water to sodium cations (Na^{+}) and chloride anions (Cl^{-}). Sodium and chloride ions occur naturally in soils and waters. Sodium is an essential element for animal life and is classified as a "dietary inorganic macro-mineral." Chloride is an essential micronutrient in soil. Chloride ion is a natural component of soils. Therefore, in the absence of large amounts of sodium chloride the effect of either ion would be minimal. Neither sodium nor chloride ions undergo complex transformations that might affect

their ultimate impact on the environment. Sodium chloride is not expected to contaminate ground water or soil and does not accumulate in the food chain. The information and data available to the Agency support the conclusion that the currently registered indoor uses of sodium chloride (as a disinfectant and non-food contact surface sanitizer) at a very low concentration (0.15%) will not result in unreasonable adverse effects to humans or the environment. Therefore, the Agency believes that no environmental fate or ecological effects assessments or data are needed for this active ingredient.

Normally four eco-toxicity studies (acute avian oral, acute avian dietary, acute freshwater fish, and acute freshwater invertebrate) would be required for antimicrobial pesticides to provide data for labeling statements concerning non-target species. The Agency has conducted a thorough review of the scientific database for sodium chloride and determined that there is sufficient information regarding the non-toxic nature of sodium chloride. Therefore, all avian and aquatic studies for sodium chloride have been waived.

Based on indoor use patterns, low exposure levels, the chemical's natural occurrence in the environment and living organisms, common use as a food item, lack of reported adverse effects information, and very low/non-toxicity potential, the Agency has determined that the registered uses of sodium chloride will have "no effect" (NE) on endangered or threatened terrestrial or aquatic species, or their designated critical habitats, as listed by the U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration (NOAA). As a result, no further risk assessment is anticipated unless new information warrants such action.

Sodium Bromide

Sodium bromide is a stable salt with no pesticidal activity. The salt dissociates in water to sodium and bromide ions, which do not undergo any further degradation. Activators such as chlorine and sodium hypochlorite react with the dissociated bromide ion to form hypobromous acid (HOBr), which is the actual pesticide. Therefore, testing is required on hypobromous acid in order to fulfill the guideline requirements for sodium bromide. Hypobromous acid is formed from both sodium bromide and bromine chloride when added to water. Therefore, the bromine chloride database was used to fulfill some data requirements for sodium bromide.

On a case-by-case basis, the Agency may determine that activators or other substances that are not part of the pesticide formulation need to be registered as a pesticide under FIFRA. This determination will depend on, among other things, the following: the nature of chemical reactions that take place between the active ingredient and the activator or other compound; the ways in which the activator or other compound is distributed, sold and why; and the use site, location and/or other circumstances or ways where or when mixing of the activator or other compound and the pesticide formulation occurs.

For sodium bromide, all environmental fate data requirements have been waived. Also, there are no outstanding terrestrial, aquatic and estuarine/marine animal eco-toxicity data requirements for sodium bromide or hypobromous acid. However, it is anticipated that the

following non-target plant toxicity testing will be required to support the use of sodium bromide for once-through industrial water systems use.

Anticipated Ecological Toxicity Data Needs for Sodium Bromide

- (850.4225) Seedling emergence - dose response using rice (*Oryza sativa*)
- (850.4250) Vegetative vigor dose response test using rice (*Oryza sativa*)
- (850.4400) Aquatic plant growth using floating macrophyte *Lemna gibba*
- (850.5400) Aquatic plant growth (algal and aquatic plant toxicity) - Tier II (using TGAI or TEP) – Four species (*Selenastrum capricornutum* (green algae), *Anabaena flos-aquae* (blue-green cyanobacteria), *Navicula pelliculosa* (freshwater diatom), and *Skeletonema costatum* (marine diatom)).

As previously mentioned, the Agency has not conducted a risk assessment that supports a complete endangered species determination for sodium bromide. The ecological risk assessment planned during registration review will allow the Agency to determine whether sodium bromide's use has "no effect" or "may affect" federally listed threatened or endangered species (listed species) or their designated critical habitats. When an assessment concludes that a pesticide's use "may affect" a listed species or its designated critical habitat, the Agency will consult with the U.S. Fish and Wildlife Service and/or National Marine Fisheries Service (the Services), as appropriate.

Timeline

The EPA has created the following estimated timeline for the completion of the inorganic halides registration review case.

Registration Review for Inorganic Halides Projected Registration Review Timeline	
Activities	Time
Opening Docket	
Open Public Comment Period for Inorganic Halides Docket	Completed March 2009
Close Public Comment Period	Completed June 2009
Case Development	
Develop Final Work Plan (FWP)	September 2009
Issue Final DCI	July 2010
Data Submission	July 2011
Open Public Comment Period for Preliminary Risk Assessments	November 2011
Close Public Comment Period	January 2012
Registration Review Decision	
Open Public Comment Period for Proposed RR Decision	April 2012
Close Public Comment Period	July 2012
Final Decision	October 2012 ¹
Total (years)	3.5

¹ This date is likely to change based on the anticipated aggregate assessment for bromine releasing chemicals that degrade to bromate ion.

Next Steps

A DCI will be developed for this registration review case regarding the data needs listed under the “Risk Assessment and Data Needs” section of this document. The Agency expects to issue the DCI in 2010. Also, a human health assessment will be conducted to assess possible exposure to bromate ion resulting from the use of sodium bromide to treat swimming pools; and, an environmental fate and ecological hazard assessment will be conducted to support the use of sodium bromide for once-through industrial water systems.

II. FACT SHEET

Background Information

- Inorganic halides registration review case number: 4051
- Inorganic halides PC Codes: 013902; 013905; 013907
- Inorganic halides CAS Registry #: 7786-30-3; 7647-14-5; 7647-15-6
- Technical Registrants: Albemarle Corporation; BioLab Inc.; Great Lakes Chem Corp.; ICL-IP America, Inc.; Suncoast Chemical Corp
- First approved for use in a registered product: 1987 (magnesium chloride); 1954 (sodium chloride); 1975 (sodium bromide)
- Antimicrobials Division Chemical Review Manager (CRM): K. Avivah Jakob, jakob.kathryn@epa.gov
- Antimicrobials Division Product Manager (PM): Emily Mitchell, mitchell.emily@epa.gov

Chemical Structures

Magnesium Chloride	$\text{Cl}-\text{Mg}\begin{array}{c} \text{Cl} \end{array}$
Sodium Chloride	Na-Cl
Sodium Bromide	Br-Na

Use & Usage Information

For additional usage information and details, please refer to the “Appendix A: Use and Usage Information for the Inorganic Halides (PC Codes 013902; 013905; 013907),” of this document.

- Number of Products: 1 (magnesium chloride); 2 (sodium chloride); 74 (sodium bromide)
- Number Products as an Inert: 285 (magnesium chloride- list 4B inert based on minimal risk and low concern for potential human health and/or environmental effects); 1,399 (sodium chloride products- list 4A inert); 44 (sodium bromide- list 4B inert)
- Magnesium Chloride Uses: For agricultural use only on all types of ice plant, newly planted or established, for selective weed control.
- Sodium Chloride Uses: Disinfectant, sanitizer (non-food contact surface), bactericide, fungicide, virucide and algacide for hard non-porous surfaces in institutional, commercial, residential, food processing and public service facilities, and industrial, animal and agricultural facilities.
- Sodium Bromide Uses: Water disinfectant, sanitizer, slimicide, bactericide, algacide, fungicide, and molluscicide. Use sites include aquatic non-food industrial sites (e.g., commercial and industrial re-circulating water-cooling systems, wastewater treatment, industrial once-through water cooling systems, pulp and paper mill water systems); aquatic non-food residential sites (e.g., ornamental ponds/aquaria, swimming pool water systems, domestic/commercial non-potable water); indoor food sites (e.g., food

processing water systems), and indoor non-food sites (e.g., pasteurizer/ warmer/cannery cooling water systems).

- **Application Rate Examples:**
 - *Sodium Chloride*- Application rates range from 0.5%-3% solution. For hard non-porous surfaces and equipment use 200 ppm chlorine dioxide solution for disinfection.
 - *Sodium Bromide*- For treatment of agricultural premises and equipment rates range between 3.5-8 ounces of product per 1,000 gallons of water. For swimming pool treatment add 2.0-80 oz of product per 5,000 gallons of water.

Recent Regulatory Actions

- Inorganic Halides Reregistration Eligibility Decision (RED) Document, 1993
<http://www.epa.gov/pesticides/reregistration/status.htm>
- Bromine Tolerance Reassessment Eligibility Decision (TRED), 2005
<http://www.epa.gov/pesticides/reregistration/status.htm>

Human Health Risk Assessment Status

The Agency has reviewed all available information and data regarding the inorganic halides. Based on the low toxicity of parent magnesium chloride, sodium chloride and sodium bromide (the inorganic halides), the Agency currently anticipates that no additional toxicity and exposure data will be needed for the active ingredients in the inorganic halides registration review case. In addition, the Agency does not anticipate that any further occupational or residential handler assessments will be needed for these three parent active ingredients. However, based on sodium bromide's current use patterns (e.g., treatment of swimming pools), sodium bromide products are expected to generate bromate ion. Bromate has been recognized as inducing systemic adverse effects and has been identified by the Agency as a probable human carcinogen (U.S. EPA, *Guidelines for Carcinogen Risk Assessment*, 1986.). Therefore, the Agency anticipates that additional data are needed on the formation of bromate ion in swimming pool water; and that updated occupational and residential assessments will be needed to assess possible exposure to bromate ion from the use of sodium bromide in swimming pools. Upon completion of the risk assessment stages of all antimicrobials generating bromate ion, the exposures to bromate ion derived from each of these antimicrobial registration review cases will be aggregated with any other known sources, if co-exposure is determined to be likely. This information will be needed to ensure that the inorganic halides registration review case meets the safety standards established by FIFRA and FFDCA, as amended by FQPA.

Environmental Fate & Ecological Risk Assessment Status

The Agency believes that environmental fate and ecological effects assessments and data will not be needed for magnesium chloride and sodium chloride. EPA has made a "No Effect" determination for endangered species for magnesium chloride and sodium chloride and further environmental risk assessment will not be conducted unless public comments provide new information or data that warrant such assessment.

For sodium bromide, the Agency has not conducted a risk assessment that supports a complete endangered species determination. The ecological risk assessment planned during registration review will allow the Agency to determine whether sodium bromide's use has "no

effect” or “may affect” federally listed threatened or endangered species (listed species) or their designated critical habitats. When an assessment concludes that a pesticide’s use “may affect” a listed species or its designated critical habitat, the Agency will consult with the U.S. Fish and Wildlife Service and/or National Marine Fisheries Service (the Services), as appropriate.

Non-target plant toxicity data are anticipated as being needed for sodium bromide to conduct an environmental exposure risk assessment for the once-through industrial water systems use.

Tolerances

- A tolerance exemption has been established for residues of magnesium chloride when used as a safener in accordance with good agricultural practices as an inert or occasionally as an active ingredient in pesticide formulations that are applied to growing crops or to raw agricultural commodities after harvest [40 CFR 180.1001 (c)].
- A tolerance exemption has been established for sodium bromide. This tolerance exemption indicates that when used for ready to use food contact sanitizing solutions, the end-use concentration of sodium bromide in the solution is not to exceed 200 ppm total available halogen [40 CFR 180.940 (c)].

Data Call-In Status

Magnesium Chloride

- In January of 1994, EPA issued a GDCI (generic data call-in) for product chemistry data (data requirement satisfied), ecological effects data, environmental fate data, and human toxicity data.

Sodium Chloride

- In October of 1992, EPA issued a GDCI (generic data call-in) for product chemistry data (data requirement satisfied), environmental fate data, and human toxicity data
- In February of 1994, EPA issued a PDCI (product data call-in).

Sodium Bromide

- In January of 1994, EPA issued a GDCI for product chemistry data (data requirements satisfied), ecological effects data, environmental fate data, and human toxicity data.
- In February of 1994, EPA issued a PDCI for product chemistry data (data requirements satisfied), environmental fate data, and human toxicity data.
- The Agency anticipates issuing a data call-in (DCI) for sodium bromide to support the registration review risk assessment process.

Labels

Table 1. Registered Active Products- Magnesium Chloride

Registration #	Registration Name	Company Name	Formulation Type	% of Active Ingredient
84396-30	Killer for Ice Plant Weeds	Sungro Products, LLC	Pressurized Liquid	20.4

Table 2. Registered Active Products- Sodium Chloride

Registration #	Registration Name	Company Name	Formulation Type	% of Active Ingredient
71654-6	Virkon® S	E.I. DuPont de Nemours and Company	Powder Form Tablet Form Sachet Form	1.5
71654-7	Virkon®	E.I. DuPont de Nemours and Company	Powder Form Tablet Form	1.5

Table 3. Registered Active Products- Sodium Bromide

Registration Number	Registration Name	Company Name	Formulation Type	% of Active Ingredient
935-71	Towerbrom 60M Granules	Occidental Chemical Corporation	Granular	7
935-75	Towerbrom 90M Tablets	Occidental Chemical Corporation	Pelleted/Tableted	6.9
935-78	Towerbrom 9010 Tablets, Three Inch Tablets	Occidental Chemical Corporation	Pelleted/Tableted	9.9
1448-345	Busan 6040	Buckman Laboratories Inc	Ready-to-use solution	40
1706-168	Nalco Acti-Brom 1338 Chlorine Enhancer & Biodispersant	Nalco Company	Ready-to-use solution	42.8
1706-179	Stabrex ST 70	Nalco Company	Ready-to-use solution	9.23
1706-181	93NF 152	Nalco Company	Ready-to-use solution	42.8
1706-217	H-940 Microbiocide	Nalco Company	Ready-to-use solution	40
1706-235	Nalco V04S0	Nalco Company	Ready-to-use solution	30
1757-109	Drewborm Precursor	Drew Industrial Division	Ready-to-use solution	40
2214-12	Biorid® 46i	Tetra Technologies, Inc.	Ready-to-use solution	45.3

Registration Number	Registration Name	Company Name	Formulation Type	% of Active Ingredient
2214-13	Biorid® 40i	Tetra Technologies, Inc.	Soluble concentrate	40
2214-14	Biorid® 38i	Tetra Technologies, Inc.	Soluble concentrate	38
2214-15	Biorid® 43i	Tetra Technologies, Inc.	Soluble concentrate	43
3377-25	Sanibrom 40 Biocide	Albemarle Corporation	Ready-to-use solution	40
3377-28	Sodium Bromide 45 Technical	Albemarle Corporation	Formulation intermediate	45
3377-29	Sanibrom 45 Biocide	Albemarle Corporation	Soluble concentrate	45
3377-32	Sodium Bromide 40 Technical	Albemarle Corporation	Formulation intermediate	40
3377-34	Sanibrom S Biocide Technical	Albemarle Corporation	Technical chemical	98
3377-74	Stabrom 910 Biocide	Albemarle Corporation	Ready-to-use solution	9.23
3432-58	Diamond Sani Brom	N. Jonas & Co., Inc.	Ready-to-use solution	35
3876-158	Spectrus OX109	GE Betz, Inc.	Ready-to-use solution	40
3876-159	Spectrus OX1201	GE Betz, Inc.	Ready-to-use solution	40
5185-376	Bioguard Spaguard Brominating Concentrate	Bio-Lab, Inc.	Granular	14.7
5185-447	NaBr97-M	Bio-Lab, Inc.	Formulation intermediate	97
5185-448	NaBr97-E	Bio-Lab, Inc.	Soluble concentrate	97
5185-449	NaBr46-M	Bio-Lab, Inc.	Formulation intermediate	46
5185-450	NaBr46-E	Bio-Lab, Inc.	Ready-to-use solution	46
5185-451	NaBr40-E	Bio-Lab, Inc.	Soluble concentrate	40
5185-466	NaBr38-E	Bio-Lab, Inc.	Ready-to-use solution	38
5185-467	NaBr43-E	Bio-Lab, Inc.	Soluble concentrate	43
5785-66	WTA Sodium Bromide	Great Lakes Chem Corp	Ready-to-use solution	46
5785-67	Sodium Bromide	Great Lakes Chem Corp	Formulation intermediate	46
5785-76	Liquibrom 3800	Great Lakes Chem Corp	Ready-to-use solution	38
5785-78	Liquibrom 100	Great Lakes Chem Corp	Technical chemical	97
5785-79	Liquibrom 4300	Great Lakes Chem Corp	Ready-to-use solution	42.8
5785-80	WTA 1500	Great Lakes Chem Corp	Ready-to-use solution	15
5785-81	WTA 4000	Great Lakes Chem Corp	Ready-to-use solution	40
7364-30	Enhance	GLB Pool & Spa	Ready-to-use solution	32.18

Registration Number	Registration Name	Company Name	Formulation Type	% of Active Ingredient
8622-45	Sodium Bromide-Comp	ICL-IP America, Inc.	Technical chemical	99
8622-49	Bromide Plus	ICL-IP America, Inc.	Ready-to-use solution	40
8622-57	Hybrom 99	ICL-IP America, Inc.	Granular	99
8622-66	Sodium Bromide 45%	ICL-IP America, Inc.	Ready-to-use solution	45
8622-67	Sodium Bromide 43%	ICL-IP America, Inc.	Soluble concentrate	43
8622-69	Bromicharge	ICL-IP America, Inc.	Impregnated materials	99
8622-78	Sodium Bromide-SP	ICL-IP America, Inc.	Technical chemical	99
8959-52	Applied Biochemists's Yellowtrine	Applied Biochemists	Granular	98
10324-95	MA-Brom	Mason Chemical Co	Ready-to-use solution	98
15300-26	Chemical Treatment CL-40	Chemtreat Inc	Soluble concentrate	40
45309-43	Swimfree Charge	Aqua Clear Industries, LLC	Ready-to-use solution	35
45337-6	Winter Treat Algicide	United Chemical Corp.	Ready-to-use solution	22.3
45337-7	Spring Treat Algicide	United Chemical Corp.	Ready-to-use solution	20.8
45337-8	Yellow Treat Algicide	United Chemical Corp.	Ready-to-use solution	88.8
45337-9	Green Treat Algicide	United Chemical Corp.	Ready-to-use solution	48.5
45337-10	Take Out Algicide	United Chemical Corp.	Ready-to-use solution	10.4
45337-11	No Mor Problems	United Chemical Corp.	Ready-to-use solution	41.4
46043-27	Stop Yellow	Suncoast Chemicals Co	Ready-to-use solution	99
46043-28	Sodium Bromide Technical	Suncoast Chemicals Co	Technical chemical	99
46043-29	Trouble Free	Suncoast Chemicals Co	Ready-to-use solution	40
54998-9	Brom-Aid	Capo Industries, Ltd.	Soluble concentrate	35
58616-1	PCT 3026	Prochemtech International, Inc	Soluble concentrate	9
58616-5	PCT 3023	Prochemtech International, Inc	Soluble concentrate/solid	46.8
58616-6	3024	Prochemtech International, Inc	Soluble concentrate	14.9
62481-1	The Yellow Stuff	Jacks Magic Products, Inc.	Granular	99
63838-3	Brommax	Enviro Tech Chemical Services, Inc.	Soluble concentrate	14.77
63838-5	Brommax 7.1	Enviro Tech Chemical Services, Inc.	Soluble concentrate	10.28
69470-31	Yellow Algae Remover	Clearon Corp	Ready-to-use solution	99

Registration Number	Registration Name	Company Name	Formulation Type	% of Active Ingredient
70369-1	Microstat 2	Chemlink Laboratories, LLC	Pelleted/tableted (Tablet A)	9.7
74655-19	Spectrum XD9400	Hercules Incorporated	Ready-to-use solution	40
75562-1	Sani-Spa Disinfectant Tablet	Sani-Care Salon Products Inc.	Pelleted/tableted	4.9
83451-17	Bromicide 4000	Bwa Water Additives US LLC	Soluble concentrate	40
83451-18	Bromicide 4300	Bwa Water Additives US LLC	Soluble concentrate	40
83451-19	Bromicide 4600	Bwa Water Additives Us LLC	Soluble concentrate	46
84024-1	Justeq07	Justeq, LLC	Soluble concentrate	1.5

III. GLOSSARY of TERMS & ABBREVIATIONS

ai	Active Ingredient
AR	Anticipated Residue
ASTM	American Society for Testing and Materials
AWPA	American Wood Preserver's Association
CFR	Code of Federal Regulations
cPAD	Chronic Population Adjusted Dose
CSF	Confidential Statement of Formula
CSFII	USDA Continuing Surveys for Food Intake by Individuals
DCI	Data Call-In
DEEM	Dietary Exposure Evaluation Model
DFR	Dislodgeable Foliar Residue
DNT	Developmental Neurotoxicity
DWLOC	Drinking Water Level of Comparison
EC	Emulsifiable Concentrate Formulation
EDWC	Estimated Drinking Water Concentration
EEC	Estimated Environmental Concentration
EPA	Environmental Protection Agency
EUP	End-Use Product
FDA	Food and Drug Administration
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FFDCA	Federal Food, Drug, and Cosmetic Act
FQPA	Food Quality Protection Act
FOB	Functional Observation Battery
GENEEC	Tier I Surface Water Computer Model
GRAS	Generally recognized as safe
IR	Index Reservoir
LC ₅₀	Median Lethal Concentration. A statistically derived concentration of a substance that can be expected to cause death in 50% of test animals. It is usually expressed as the weight of substance per weight or volume of water, air or feed, e.g., mg/l, mg/kg or ppm.
LD ₅₀	Median Lethal Dose. A statistically derived single dose that can be expected to cause death in 50% of the test animals when administered by the route indicated (oral, dermal, inhalation). It is expressed as a weight of substance per unit weight of animal, e.g., mg/kg.
LOC	Level of Concern
LOAEL	Lowest Observed Adverse Effect Level
µg/g	Micrograms Per Gram
µg/L	Micrograms Per Liter
mg/kg/day	Milligram Per Kilogram Per Day
mg/L	Milligrams Per Liter
MOE	Margin of Exposure
MRID	Master Record Identification (number). EPA's system of recording and tracking submitted studies.
MUP	Manufacturing-Use Product
NA	Not Applicable
NAWQA	USGS National Ambient Water Quality Assessment
NPDES	National Pollutant Discharge Elimination System
NR	Not Required
NOAEL	No Observed Adverse Effect Level
OPP	EPA Office of Pesticide Programs
OPPTS	EPA Office of Prevention, Pesticides and Toxic Substances
PAD	Population Adjusted Dose
PAIRA	Pure Active Ingredient Radiolabelled
PCA	Percent Crop Area
PDP	USDA Pesticide Data Program

PHED	Pesticide Handler's Exposure Data
PHI	Preharvest Interval
ppb	Parts Per Billion
PPE	Personal Protective Equipment
ppm	Parts Per Million
PRZM/EXAMS	Tier II Surface Water Computer Model
Q ₁ *	The Carcinogenic Potential of a Compound, Quantified by the EPA's Cancer Risk Model
RAC	Raw Agriculture Commodity
RED	Reregistration Eligibility Decision
REI	Restricted Entry Interval
RfD	Reference Dose
RQ	Risk Quotient
SCI-GROW	Tier I Ground Water Computer Model
SAP	Science Advisory Panel
SF	Safety Factor
SLN	Special Local Need (Registrations Under Section 24©) of FIFRA)
TGAI	Technical Grade Active Ingredient
TEP	Typical End-Use Product
USDA	United States Department of Agriculture
UF	Uncertainty Factor
WPS	Worker Protection Standard

Appendix A:
Use and Usage Information for the Inorganic Halides (PC Codes 013902; 013905; 013907)

Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
Sodium Chloride (NaCl)				
Commercial, Institutional and Industrial Premises and Equipment				
Hard nonporous surfaces & equipment in: Commercial ornamental Greenhouses Nurseries Shade Houses Garden Centers Florists.	70060-29 Pelleted/Tableted	Open pour	Use a 200 ppm chlorine dioxide solution.	
Equipment Irrigation Systems	70060-29 Pelleted/Tableted	Open pour	Use a 200 ppm chlorine dioxide solution.	
Evaporative Cooling Systems	70060-29 Pelleted/Tableted	Open pour	Use a 200 ppm chlorine dioxide solution.	
Recirculating irrigation systems	70060-29 Pelleted/Tableted	Open pour	Treatment may be done at 0.01 ppm to 0.5 ppm maximum hose end output.	
Non-recirculating irrigation systems	70060-29 Pelleted/Tableted	Open pour	Treatment may be done at 0.01 ppm to 0.5 ppm maximum hose end output.	
Propagation misting systems	70060-29 Pelleted/Tableted	Open pour	Treatment in may be done at 0.01 ppm to 0.25 ppm maximum hose end output.	
Institutional and Commercial Facilities, nonporous food contact surfaces	71654-7 Soluble concentrate	Open pour	Remove gross dirt and prepare 1.0% product solution. Apply to surface using a sponge, brush, or spray device until the surface is visibly clean. Let stand for 10 minutes and rinse with potable water.	
Institutional and Commercial Facilities, nonporous non-food contact surfaces	71654-7 Soluble concentrate	Open pour	Remove gross dirt and use 1.0% product solution. Apply to surface using a mop, sponge, brushes or spray device until the surface is visibly clean. Let stand 10 minutes and air dry.	

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Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
Agricultural Premises and Equipment				
Facilities used for temporary confinement of animals: Barns Sheds Stables Pens, Cages Associated access alleys or walkways Equipment related to the maintenance of animals found at fairs, exhibitions, animal auction yards, animal show/boarding facilities Other similar agricultural facilities designed for the temporary housing of animals.	71654-6 Soluble concentrate	Open pour	A 1% solution of product is recommended to clean and disinfect inanimate surfaces associated with facilities used for the temporary confinement of animals.	
Poultry broiler/breeder houses	71654-6 Soluble concentrate	Open pour	Fill container with desired amount of water and add product powder or tablet(s) to achieve recommended solution concentration. For a 1% solution, add one (1) tablet to one pint of water. For a 1% solution, empty one 1.3 oz. sachet into 1 gallon of water.	
Poultry hatcheries	71654-6 Soluble concentrate	Open pour	Fill container with desired amount of water and add product powder or tablet(s) to achieve recommended solution concentration. For a 1% solution, add one (1) tablet to one pint of water. For a 1% solution, empty one 1.3 oz. sachet into 1 gallon of water.	
Poultry facility air sanitizing	71654-6 Soluble concentrate	Open pour	Use solution at 0.5-1% solution, and fog until surfaces are moist. Allow at least 2 hours before entering treated area. Rinse foggers and sprayers with water following use.	Not approved for this use in California.

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Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
Swine production: Farrowing units Nurseries Finisher houses Processing plants Agricultural production equipment such as trucks, waterproof footwear and associated livestock equipment and instruments.	71654-6 Soluble concentrate	Open pour	Clean using product at 1% solution. For fogging use product at 0.5-1% solution Fog (wet mist) until the area is moist using automatic foggers according to manufacturer's use directions. Rinse foggers and sprayers with water following use.	Not approved in California for fogging at dilutions less than 1%.
Equine production: Stables Horse Boxes Box Stalls Tack Equipment Feed Rooms	71654-6 Soluble concentrate	Open pour	Thoroughly clean and dry surfaces then wash the area manually or with pressure washer with a 1% product solution. Rinse with clean water.	
Equine production: Blankets Saddle Pads Rugs	71654-6 Soluble concentrate	Open pour	Shampoo by hand or spray lightly with a hand-sprayer and leave to dry. Shake or vacuum to remove residue.	Not an approved use in California

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Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
Equine production facilities Aerial spraying	71654-6 Soluble concentrate	Open pour	Use a hand or knapsack sprayer with fine setting, or an automatic spraying system. Spray a 1% product solution for 2-3 minutes twice daily, first thing in the morning and last thing at night. Rinse sprayers with water after use.	Not an approved use in California
Bovine production: Housing stabling hospital quarantine pens Feedlot facilities Agricultural production equipment: such as trucks, water-proof footwear and associated livestock equipment and instruments.	71654-6 Soluble concentrate	Open pour	Follow General Instructions to remove livestock and pre-clean area to be treated. A 1% solution of solution is recommended to clean and disinfect areas associated with	
Aquaculture: Vehicles Nets Boots Waders Dive suits Hoses Brushes Other similar equipment. Foot dips	71654-6 Soluble concentrate	Open pour	Equipment used in separate sites, tanks, ponds in aquacultural settings should be disinfected before each new use by soaking for 20-30 minutes in a 1% product solution followed by a water rinse. Product at 0.5-1% solution is recommended for use in fogging (wet misting) operations or as a supplemental measure either before or after regular cleaning and disinfecting procedures. Fog (wet mist) until the area is moist using automatic foggers according to manufacturer's use directions.	Not approved for this use in California.

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Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
Emergency disease control (animal health) facilities/equipment: Agricultural Military Airport Port Rail Quarantine Slaughter Other shipping facilities and equipment where animals or soils suspected of harboring foot and mouth disease virus might have been previously present.	71654-6 Soluble concentrate	Open pour	A 1% solution of product is recommended to clean and disinfect Do not immerse metal objects for long periods - 10 minutes is maximum contact time.	Not approved for this use in California.
Medical Premises and Equipment				
Companion animals: all surfaces equipment instruments utensils cages & caging systems associated with Veterinary Medical Hospitals, infectious disease wards, quarantine areas, Humane Society facilities, laboratory animal quarters, grooming and boarding facilities, kennels, catteries and animal transportation vehicles	71654-6 Soluble concentrate	Open pour	A 1% solution of product is recommended as a “one step” cleaning and disinfecting procedure. Remove Gross filth and heavy soil deposits before application of the disinfecting/cleaning solution. Do not immerse metal objects for long periods - 10 minutes is maximum contact time.	

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Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
Public service, nonporous food contact surfaces	71654-7 Soluble concentrate	Open pour	Remove gross dirt and prepare 1.0% product solution. Apply to surface using a sponge, brush, or spray device until the surface is visibly clean. Let stand for 10 minutes and rinse with potable water.	This product is not to be used on any surface or instrument that (1) is introduced directly into the human body, either into or in contact with the bloodstream or normally sterile areas of the body, or (2) contacts intact mucous membranes but which does not ordinarily penetrate the blood barrier or otherwise enter normally sterile areas of the body.

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Use and Usage Information for the Inorganic Halides (PC Codes 013902; 013905; 013907)

Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
Manikins used in CPR training:	71654-7 Soluble concentrate	Open pour	<p>Prepare a 3% solution by dissolving 3 tablets (5 gm each) of product in 16 oz. water or by dissolving 1 tablet (5 gm) of product in pre-marked 5.3 oz spray bottle that has been filled to line with water. Spray manikin surface (mouth and nose area) or wipe with a cloth saturated with 3% solution until fully wetted. Allow surface to remain visibly wet for a minimum of 30 seconds, and wipe with a disposable cloth until dry. Rinse surface with potable water.</p> <p>Cleaning and Disinfecting manikins after class: Manikins should be cleaned as soon as possible at the end of each class to avoid drying of contaminants on surfaces. Disassemble the manikin as directed by the manufacturer's instructions. Thoroughly wash all internal and external surfaces and reusable protective face shields with a brush using a 1% solution. Let stand for 10 minutes and rinse with potable water.</p>	

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Use and Usage Information for the Inorganic Halides (PC Codes 013902; 013905; 013907)

Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
Crisis Scene Disinfection of Hard Non-Porous Surfaces:	71654-7 Soluble concentrate	Open pour	Remove gross dirt. Make a 1% solution using packets and bottles of pre-measured water provided. Completely empty entire contents of [sachet] [pouch] [packet] [bag] into the bottle of water provided. Recap bottle and gently shake until powder is dissolved. Remove cap and replace with sprayer. Apply to surface until surface is visibly wet. Let stand 10 minutes and air dry.	<p>Not for use with Medical Instruments.</p> <p>This product is not to be used on any surface or instrument that (1) is introduced directly into the human body, either into or in contact with the bloodstream or normally sterile areas of the body, or (2) contact intact mucous membranes but which does not ordinarily penetrate the blood barrier or otherwise enter normally sterile areas of the body.</p>

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Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
Commercial, Institutional and Industrial Premises and Equipment				
Greenhouses and Horticulture: Floors Walls Glasshouse structures Ventilation and other equipment Utensils Trays Storage rooms Vehicles	71654-6 Soluble concentrate	Open pour	Use a dilution of 1:100 or 1.3 oz. product per gallon of clean water. Use a dilution of 1:50 or 2.6 oz. per gallon of clean water if surfaces that are to be treated have not been pre-cleaned with water to remove organic deposits. For clean non-porous surfaces use a dilution of 1:100 or 1.3 oz. per gallon of clean water. Soak tools to ensure complete coverage.	Not approved in California for use at 1...50 dilution on surfaces that have not been pre-cleaned with water to removed organic deposits.
Greenhouses and Horticulture: Water systems	71654-6 Soluble concentrate	Open pour	Run a 1% solution through the system or soak equipment in a 1% solution. Let stand for ten minutes and flush system with clean water after treatment.	Not approved in California for use on water systems
Greenhouses and Horticulture: Evaporative coolers	71654-6 Soluble concentrate	Open pour	Treat existing algae and slime-contaminated surfaces with a 1:100 dilution of product. Treat cooler water every week with a dilution of 1:200 or 0.65 oz. of product for every gallon of cooler water.	Not approved in California for use on ventilation systems

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Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
SODIUM BROMIDE (BrNa)				
Agricultural Premises and Equipment				
Shell Egg Pasteurizer Water Systems	Ready-to-use solution 1706-179	Open pour	Add 3.5-7.0 ounces of product per 1,000 gallons of system water to achieve control.	This use not currently authorized in California
	Soluble concentrate 63838-3 63838-5 84024-1	Open pour	Add 4.0 – 8.0 ounces of product per 1,000 gallons of system water to achieve control.	Not for use in California.
Heat transfer systems	Ready-to-use solution 1706-179	Open pour	Add sufficient product to the air washer sump or chill water to provide a total bromine level of 4.5-9.0 ppm. Add to the system at a point of uniform mixing such as a basin area, sump area, or other reservoir or collecting area from which tile treated water will be circulated uniformly throughout the system.	
Drip Irrigation Systems	Soluble concentrate 5185-467	Open pour	Add sufficient amount of this product and oxidize with either gas chlorine or sodium hypochlorite solution to achieve a residual bromine level of 0.2 to 5 ppm as needed to maintain control of the system. For 0.2 ppm bromine add 0.000464 gallons of this product mixed with 0.0016 gallons 12.5% bleach or 0.00168 lbs. gas chlorine per 1,000 gallons water treated.	
Materials Preservatives				
Industrial products that control biofilm deposits	Formulation Intermediate 3377-28 3377-32	Open pour	MUP	

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Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
Industrial Processes and Water Systems				
Air Washers	Formulation Intermediate 5785-67	Open pour	MUP	
	Technical Chemical 5785-78	Open pour	MUP	
	Ready-to-use solution 1706-179 3377-74	Open pour	Add sufficient product to the air washer sump or chill water to provide a total bromine level of 4.5-9.0 ppm. Badly fouled systems must be cleaned before treatment is begun. Some systems may be maintained in satisfactory biological condition by applying this dosage once per day while others will respond better to dosages less than once per day.	
	Ready-to-use solution 3876-158 3876-159 5185-450 5185-466 5785-66 5785-76 5785-79 5785-80 74655-19 83451-17 83451-18 83451-19	Open pour	INITIAL DOSE: Add 0.0001 to 0.24 gallon of product per 1,000 gallons of water contained in the system and oxidize with either gas chlorine (0.008 to 0.08 lb. gas chlorine per 1000 gallons of contained water), or sodium hypochlorite solution (0.006 to 0.07 gallons of 12.5% sodium hypochlorite solution per 1,000 gallons of contained volume). SUBSEQUENT DOSE: Add 0.0001 to 0.082 gallon of this product per 1,000 gallons of water contained in the system, and oxidize with either gas chlorine (0.004 to 0.08 lb. gas chlorine per 1,000 gallons of contained water), or sodium hypochlorite solution (0.003 to 0.07 gallons of 12.5% sodium hypochlorite solution per 1,000 gallons contained volume).	

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Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
Air Washers continued	Soluble concentrate 5185-448 5185-451 5185-467 84024-1	Open pour	Initial Dose: Add 0.03 to 0.022 gallons of this product per 1000 gallons of water contained in the system and oxidize with either gas chlorine (0.008 to 0.042 pounds gas chlorine per 1000 gallons of contained water), or sodium hypochlorite solution (0.007 to 0.034 gallons of 12.5% sodium hypochlorite solution per 1000 gallons of contained water). Subsequent Dose: Add 0.00014 to 0.022 gallons of this product per 1000 gallons of water contained in the system and oxidize with either gas chlorine (0.004 to 0.044 pounds gas chlorine per 1000 gallons of contained water), or sodium hypochlorite solution (0.003 to 0.034 gallons of 12.5% sodium hypochlorite solution per 1000 gallons of contained water).	
	Soluble concentrate 15300-26 58616-1 63838-3 63838-5	Open pour	Initial Dose: Apply product and chlorine or sodium hypochlorite to achieve a residual bromine level of 4.5 - 9 ppm or as needed to maintain control. Subsequent Dose: Apply product and chlorine or sodium hypochlorite to achieve a residual bromine level of 0.5 - 1 ppm or as needed to maintain control.	
	Pelleted/Tableted 935-75 935-78	Intermittent or slug method	INITIAL DOSE: Add this product at the rate of 0.1 to 0.5 pounds per 1,000 gallons. Repeat dosage until residual is achieved. SUBSEQUENT DOSE: When microbial control is evident, add this product at the rate of 0.02 to 0.1 pounds per 1,000 gallons. Repeat periodically as needed to maintain control.	
		Continuous feed method	INITIAL DOSE: Add this product at the rate of 0.1 to 0.5 pounds per 1,000 gallons. Repeat dosage until residual is achieved. SUBSEQUENT DOSE: Add this product at the rate of 0.02 to 0.1 pounds per day per 1,000 gallons.	

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Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
Air Washers continued	Soluble Concentrate/Solid 58616-5	Open pour	Apply product to the cooling water to provide a total bromine level of 0.5 to 5.0 ppm	
Heat transfer systems	Ready-to-use solution 1706-179 3377-74	Open pour	Add sufficient product to the air washer sump or chill water to provide a total bromine level of 4.5-9.0 ppm. Add to the system at a point of uniform mixing such as a basin area, sump area, or other reservoir or collecting area from which the treated water will be circulated uniformly throughout the system.	
	Soluble concentrate 58616-1 58616-5 63838-3 63838-5 84024-1	Open pour	Apply sufficient product achieve a residual bromine level of 0.5 – 9.0 ppm. For control of microorganisms in industrial air washer systems add sufficient product to air washer sump or chill water to provide a total chlorine level of 2.0-4.0 ppm.	
Industrial waste water impoundment	Ready-to-use solution 1706-179	Open pour	Add sufficient STABREX ST 70 to provide a total bromine level of 0.2-0.5 ppm. Badly fouled systems must be cleaned before treatment is begun.	This use not currently authorized in California
Oil recovery systems, drilling muds and packer fluids	Soluble concentrate 5785-448 63838-3	Open pour	Add sufficient product achieve a residual total bromine level of 2.2-10 ppm. Add this product to the system at a 0.125 to 2.0 sodium bromide/oxidant mole ratio. Add sufficient amount of this product directly to the drilling muds and packer fluids and oxidize with either gas chlorine or sodium hypochlorite solution to achieve a residual bromine level of up to 5 ppm or as needed to maintain control of the system.	

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Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
Once-through water systems	Formulation Intermediate 5785-67	Open pour	MUP	
	Technical Chemical 5785-78 8622-45 8622-78	Open pour	MUP	
	Granular 935-71	Open pour	Initial Dose: When the system is noticeably fouled, add this product at the rate of 0.03 to 0.75 pounds per 1,000 gallons of water. Repeat dosage until residual is achieved. Subsequent Dose: When microbial control is evident, add this product at the rate of 0.03 to 0.15 pounds per 1,000 gallons of water. Repeat periodically as needed to maintain control.	
	Granular 8622-57	Open pour	Use effectively at dosages recommended to achieve exposures to 0.5 - 5.0 parts per million (ppm) of active residual bromine.	
	Pelleted/Tableted 935-75 935-78	Open pour	INITIAL DOSE: When the system is noticeably fouled, add this product at the rate of 0.02 to 0.5 pounds per 1,000 gallons. Repeat dosage until residual is achieved. SUBSEQUENT DOSE: When microbial control is evident, add this product at the rate of 0.02 to 0.1 pounds per 1,000 gallons of water treated. Repeat periodically as needed to maintain control.	

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Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
Once-through water systems continued	Ready-to-Use solution 1448-345 8622-49 8622-66	Open pour	Add sufficient product and chlorine or sodium hypochlorite to achieve a residual bromine level of 0.5 to 5.0 ppm or as needed to maintain control.	
	Ready-to-use solution 1706-168 1706-217 3876-158 3876-159 5185-450 5185-466 5785-66 5785-76 5785-79 5785-80 5785-81 74655-19	Open pour	INITIAL DOSE: Add 0.0002 to 0.16 gallon of product per 1,000 gallons of water contained in the system and oxidize with either gas chlorine (0.02 to 0.08 lb. gas chlorine per 1000 gallons of contained water), or sodium hypochlorite solution (0.007 to 0.07 gallons of 12.5% sodium hypochlorite solution per 1,000 gallons of contained volume). SUBSEQUENT DOSE: Add 0.0001 to 0.16 gallon of this product per 1,000 gallons of water contained in the system, and oxidize with either gas chlorine (0.004 to 0.08 lb. gas chlorine per 1,000 gallons of contained water), or sodium hypochlorite solution (0.003 to 0.07 gallons of 12.5% sodium hypochlorite solution per 1,000 gallons contained volume).	
	Ready-to-use solution 1757-109 2214-12 3377-25	Open pour	Initial Dose: Apply sufficient product achieve a residual bromine level of 0.5-2 ppm or as needed to maintain control. Subsequent Dose: When Apply sufficient product to achieve a residual bromine level of 0.5-1 ppm or as needed to maintain control.	

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Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
Once-through water systems continued	Soluble concentrate 5185-448 5185-451 5185-467 83451-17 83451-18 83451-19	Open pour	Initial Dose: Add 0.0007 to 0.044 gallons of this product per 1000 gallons of water contained in the system and oxidize with either gas chlorine (0.02 to 0.08 pounds gas chlorine per 1000 gallons of contained volume), or sodium hypochlorite solution (0.02 to 0.07 gallons of 12.5% sodium hypochlorite solution per 1000 gallons of contained volume). Subsequent Dose: When microbial control is evident, add 0.0003 to 0.044 gallons of this product per 1000 gallons of water contained in the system and oxidize with either gas chlorine (0.008 to 0.08 pounds gas chlorine per 1000 gallons of contained volume), or sodium hypochlorite solution (0.006 to 0.07 gallons of 12.5% sodium hypochlorite solution per 1000 gallons of contained volume).	
	Soluble concentrate 2214-13 2214-14 2214-15 3377-29 8622-67 15300-26 63838-3	Open pour	Initial Dose: Apply sufficient product achieve a residual bromine level of 0.5 – 9.0 ppm or as needed to maintain control. Subsequent Dose: When Apply sufficient product to achieve a residual bromine level of 0.5 – 1.0 ppm or as needed to maintain control.	

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Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
Pulp & paper mill influent water systems	Granular 8622-57	Open pour	Use effectively at dosages recommended to achieve exposures to 0.5 - 5.0 parts per million (ppm) of active residual bromine.	
	Ready-to-use solution 1706-179 3377-74 3876-158 3876-159	Open pour	Product should be applied to the raw water intake prior to the filter house economizer, or process water. Feed at a dosage sufficient to provide a total bromine level of 4.5 - 9.0 ppm. Some systems may be maintained in satisfactory biological condition by applying this dosage intermittently while others may require a continuous application. Product may be used in pulp and paper influent water systems where the manufactured paper or paperboard may be used for food contact purposes.	This use not currently authorized in California
	Ready-to-use solution 5185-450 5185-466 5785-66 5785-76 5785-79 5785-80 5785-81 8622-49 8622-66 74655-19	Open pour	Add sufficient amount of mixed product/oxidant solution to achieve a residual bromine level of 0.5 to 5.0 parts per million. For 0.5 parts per million add 0.00047 gallons of product and 0.0018 gallons of (12.5%) bleach or 0.0019 pounds gas chlorine per 1,000 gallons of water treated.	

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Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
Pulp & paper mill influent water systems continued	Soluble concentrate 5185-448 5185-451 5185-467 83451-17 83451-18 83451-19	Open pour	Add this product to the system at a 0.125 to 2.0 sodium bromide/oxidant mole ratio. For 0.5 parts per million add 0.00047 gallons of product and 0.0018 gallons of (12.5%) bleach or 0.0019 pounds gas chlorine per 1,000 gallons of water treated.	
	Soluble concentrate 8622-67 63838-3 63838-5	Open pour	Use effectively at dosages recommended to achieve exposures of 1.0 - 9.0 ppm of active residual bromine.	
	Soluble concentrate 84024-1	Open pour	Product must be applied to the raw water intake prior to the filter house, economizer, or process water. Feed at a dosage sufficient to provide total a chlorine level of 2.0-4.0 ppm.	

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Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
Pulp & paper mill process water systems	Granular 8622-57	Open pour	Use effectively at dosages recommended to achieve exposures to 0.5 - 5.0 parts per million (ppm) of active residual bromine.	
	Ready-to-use solution 1706-179 3876-158 3876-159	Open pour	Product should be added to a paper making system at a point of uniform mixing such as the beaters, broke chest pump. save-all tank or white water tank. Feed at a dosage sufficient to provide a total bromine level of 4.5 - 9.0 ppm. Some systems may be maintained in satisfactory biological condition by applying this dosage intermittently while others may require a continuous application. Product may be used in pulp and paper mill process water systems where the manufactured paper or paperboard may be used for food contact purposes.	This use not currently authorized in California
	Ready-to-use solution 5185-450 5185-466 5785-66 5785-76 5785-79 5785-80 5785-81 8622-49 8622-66 74655-19	Open pour	Add sufficient amount of mixed product/oxidant solution to achieve a residual bromine level of 0.5 to 5.0 parts per million. For 0.5 parts per million add 0.00047 gallons of product and 0.0018 gallons of (12.5%) bleach or 0.0019 pounds gas chlorine per 1,000 gallons of water treated.	
	Soluble concentrate 5185-448 5185-451 5185-467 63838-3 63838-5	Open pour	Add sufficient amount of mixed product/oxidant solution to achieve a residual bromine level of 1.0 to 9.0 parts per million.	

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Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
Pulp & paper mill process water systems continued	Soluble concentrate 8622-67 83451-17 83451-18 83451-19	Open pour	Use effectively at dosages recommended to achieve exposures of 0.5 – 5.0 ppm of 'active residual bromine.	
	Soluble concentrate 84024-1	Open pour	Product must be applied to the raw water intake prior to the filter house, economizer, or process water. Feed at a dosage sufficient to provide total a chlorine level of 2.0-4.0 ppm.	
Pulp and paper mill water systems	Formulation Intermediate 5785-67	Open pour	MUP	
	Technical Chemical 5785-78 8622-45 8622-78	Open pour	MUP	
	Granular 935-71	Open pour	Initial Dose: Add product at the rate of 0.06 to 3.0 pounds per ton of dry pulp or paper produced. Repeat dosage until residual is achieved. Subsequent Dose: When microbial control is evident, add this product at the rate of 0.06 to 2.0 pounds per ton of dry pulp or paper produced. Repeat periodically as needed to maintain control.	

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Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
Pulp and paper mill water systems continued	Granular 8622-57	Open pour	Use effectively at dosages recommended to achieve exposures to 0.5 - 5.0 parts per million (ppm) of active residual bromine.	
	Pelleted/Tableted 935-75 935-78	Open pour	INITIAL DOSE: Add product at the rate of 0.04 to 2 pounds per ton of dry pulp or paper produced. Repeat dosage until residual is achieved. SUBSEQUENT DOSE: When microbial control is evident, add product at the rate of 0.04 to 1.0 pounds per ton of dry pulp or paper produced. Repeat periodically as needed to maintain control.	
	Ready-to-Use Solution 1448-345 1706-217 5185-450 5185-466 5785-66 5785-76 5785-79 5785-80 5785-81 8622-49 8622-66 74655-19	Open pour	Add sufficient amount of mixed product/oxidant solution to achieve a residual bromine level of 0.5 to 5.0 parts per million. For 0.5 parts per million add 0.00047 gallons of product and 0.0018 gallons of (12.5%) bleach or 0.0019 pounds gas chlorine per 1,000 gallons of water treated.	

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Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
Pulp and paper mill water systems continued	Soluble concentrate 5185-448 5185-451 5185-467 83451-17 83451-18 83451-19	Open pour	Add sufficient amount of mixed product/oxidant solution to achieve a residual bromine level of 0.5 to 5.0 parts per million. For 0.5 parts per million add 0.00051 gallons of product and .0019 gallons of (12.5%) bleach or 0.0019 pounds gas chlorine per 1,000 gallons of water treated.	
	Soluble concentrate 8622-67 15300-26	Open pour	Use effectively at dosages recommended to achieve exposures of 0.5 – 5.0 ppm of 'active residual bromine.	
Recirculating cooling water systems	Formulation Intermediate 5785-67	Open pour	MUP	
	Technical Chemical 5785-78 8622-45 8622-78	Open pour	MUP	
	Ready-to-use solution 1448-345 8622-49 8622-66	Open pour	Apply sufficient product and chlorine or sodium hypochlorite to achieve residual bromine levels 0.5 to 5 ppm when measured approximately 5 minutes after treatment.	

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Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
Recirculating cooling water systems continued	Granular 8622-57	Open pour	Use effectively at dosages recommended to achieve exposures to 0.5 - 5.0 parts per million (ppm) of active residual bromine.	
	Ready-to-use solution 1706-168 1706-217 3876-158 3876-159 5185-450 5185-466 5785-66 5785-76 5785-79 5785-80 74655-19 83451-17 83451-18 83451-19	Open pour	INITIAL DOSE: Add 0.0001 to 0.24 gallon of product per 1,000 gallons of water contained in the system and oxidize with either gas chlorine (0.008 to 0.08 lb. gas chlorine per 1000 gallons of contained water), or sodium hypochlorite solution (0.006 to 0.07 gallons of 12.5% sodium hypochlorite solution per 1,000 gallons of contained volume). SUBSEQUENT DOSE: Add 0.0001 to 0.082 gallon of this product per 1,000 gallons of water contained in the system, and oxidize with either gas chlorine (0.004 to 0.08 lb. gas chlorine per 1,000 gallons of contained water), or sodium hypochlorite solution (0.003 to 0.07 gallons of 12.5% sodium hypochlorite solution per 1,000 gallons contained volume).	
	Ready-to-use solution 1706-179 3377-74	Open pour	Apply to the cooling water to provide a total bromine level of 4.5-9.0 ppm. Some systems may be maintained in satisfactory biological condition by applying this dosage once per day while others will respond better to dosages less than once per day.	
	Ready-to-use solution 1706-235	Open pour	Product can be dosed to cooling water systems using either of two different methods. 1. Dose to maintain a set concentration in the treated system, maintaining 1 to 100 ppm of product within the system. 2. Dose To chlorine: bromide mole ratio, activating product with chlorine at a 1:0.1 to 1:1 chlorine.	

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Recirculating cooling water systems continued	Ready-to-use solution 2214-12 3377-25	Open pour	Initial Dose: Apply sufficient product achieve a residual bromine level of 0.5-1 ppm or as needed to maintain control. Subsequent Dose: When Apply sufficient product to achieve a residual bromine level of 0.5-1 ppm or as needed to maintain control.	
	Soluble concentrate 5185-448 5185-451 5185-467	Open pour	Initial Dose: Add 0.0003 to 0.022 gallons of this product per 1000 gallons of water contained in the system and oxidize with either gas chlorine (0.008 to 0.042 pounds gas chlorine per 1000 gallons of contained water), or sodium hypochlorite solution (0.007 to 0.034 gallons of 12.5% sodium hypochlorite solution per 1000 gallons of contained water). Subsequent Dose: Add 0.00014 to 0.022 gallons of this product per 1000 gallons of water contained in the system and oxidize with either gas chlorine (0.004 to 0.044 pounds gas chlorine per 1000 gallons of contained water), or sodium hypochlorite solution (0.003 to 0.034 gallons of 12.5% sodium hypochlorite solution per 1000 gallons of contained water).	
	Soluble concentrate 2214-13 2214-14 2214-15 3377-29 8622-67 15300-26 58616-1 63838-3 63838-5 84024-1	Open pour	Initial Dose: Apply sufficient product achieve a residual bromine level of 1.0 – 9.0 ppm or as needed to maintain control. Subsequent Dose: When Apply sufficient product to achieve a residual bromine level of 0.5-1 ppm or as needed to maintain control.	

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Recirculating cooling water systems continued	Soluble Concentrate/Solid 58616-5	Open pour	Apply product to the cooling water to provide a total bromine level of 0.5 to 5.0 ppm	
Sewage wastewater systems	Granular 935-71	Open pour	Dose Rate: Add product at the rate of 0.03 to 0.75 pounds per 1,000 gallons.	
	Pelleted/Tableted 935-75 935-78	Open pour	Add this product at the rate of 0.02 to 0.5 pounds per 1,000 gallons.	
	Soluble concentrate 5185-448	Open pour	Add this product to the system at a 0.125 to 2.0 sodium bromide/oxidant mole ratio Add sufficient amount of this product and oxidize with either gas chlorine or sodium hypochlorite solution to achieve a residual bromine level of up to 5 ppm or as needed to maintain control of the system.	
Secondary oil recovery systems	Soluble concentrate	Open pour	Add this product to the system at a 0.125 to 2.0 sodium bromide/oxidant mole ratio. Add sufficient amount of this product directly to the drilling muds and packer fluids and oxidize with either gas chlorine or sodium hypochlorite solution to achieve a residual bromine level of up to 5 ppm or as needed to maintain control of the system.	
Water treatment	Formulation Intermediate 3377-28 3377-32	Open pour	MUP	

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Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
Wastewater	Granular 8622-57 8622-66	Open pour	Product should be added in quantities sufficient to reach residual bromine levels of 0.3-1.0 ppm measured about 5 minutes after treatment	
	Soluble concentrate 8266-67 15300-26	Open pour	Product should be added in quantities sufficient to reach residual bromide levels of 0.3- 1.0 ppm measured about 5 minutes after treatment.	
Wastewater treatment systems	Formulation Intermediate 5785-67	Open pour	MUP	
	Technical Chemical 5785-78 8622-45 8622-78	Open pour	MUP	
	Ready-to-Use Solution 1448-345 1757-109 2214-12 3377-25 8622-49	Open pour	Add sufficient product and chlorine or sodium hypochlorite to achieve residual bromine levels of 0.3 ppm to 2 ppm when measured approximately 5 minutes after treatment	

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Wastewater treatment systems continued	Ready-to-use solution 1706-168 1706-217 3876-158 3876-159 5185-450 5185-466 5785-66 5785-76 5785-79 5785-80 5785-81 74655-19	Open pour	INITIAL DOSE: Add 0.0002 to 0.16 gallon of product per 1,000 gallons of water contained in the system and oxidize with either gas chlorine (0.02 to 0.08 lb. gas chlorine per 1000 gallons of contained water), or sodium hypochlorite solution (0.007 to 0.07 gallons of 12.5% sodium hypochlorite solution per 1,000 gallons of contained volume). SUBSEQUENT DOSE: Add 0.0001 to 0.16 gallon of this product per 1,000 gallons of water contained in the system, and oxidize with either gas chlorine (0.004 to 0.08 lb. gas chlorine per 1,000 gallons of contained water), or sodium hypochlorite solution (0.003 to 0.07 gallons of 12.5% sodium hypochlorite solution per 1,000 gallons contained volume).	
	Soluble concentrate 5185-448 5185-451 5185-467 83451-17 83451-18 83451-19	Open pour	Initial Dose: Add 0.0007 to 0.044 gallons of this product per 1000 gallons of water contained in the system and oxidize with either gas chlorine (0.02 to 0.08 pounds gas chlorine per 1000 gallons of contained volume), or sodium hypochlorite solution (0.02 to 0.07 gallons of 12.5% sodium hypochlorite solution per 1000 gallons of contained volume). Subsequent Dose: When microbial control is evident, add 0.0003 to 0.044 gallons of this product per 1000 gallons of water contained in the system and oxidize with either gas chlorine (0.008 to 0.08 pounds gas chlorine per 1000 gallons of contained volume), or sodium hypochlorite solution (0.006 to 0.07 gallons of 12.5% sodium hypochlorite solution per 1000 gallons of contained volume).	
	Soluble concentrate 2214-13 2214-14 2214-15 3377-29	Open pour	Add sufficient product to achieve residual bromine levels of 0.3 ppm to 2.0 ppm when measured approximately five minutes after treatment.	

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Residential and Public Access Premises				
Swimming pool water systems, hot tubs, spas, fountains	Technical Chemical 8622-45 8622-78	Open pour	MUP	
	Granular 5185-376	Open pour	Sanitization: Add 1 level teaspoon of product per 200 gallons of water with circulation system operating. Test for available bromine and repeat sanitation dose at 15 to 20 minute intervals until a residual of 3-6 ppm is established Super oxidation: Add 4 teaspoons of this product per 200 gallons of water with circulation system operating. Treatment of visible algae: Add 4 teaspoons of this product for each 200 gallons of water.	
	Granular 8959-52 62481-1	Open pour	To remove visible yellow or mustard algae: (All dosages are for 10,000 gallons of water). 1. Brush walls and floor areas affected by yellow algae accumulations. 2. Apply 4 oz. (4 capfuls) of this product per 10,000 gallons as close to the affected areas as possible. For severe accumulations double the above dosage. 3. Superchlorinate by adding 1 gallon liquid chlorinating compound or 1 lb. of a dry chlorinating compound per 10,000 gallons.	Swimming pools
	Impregnated materials 8622-69	Open pour	Upon initial filling of spa with fresh water, add 1.2 pounds of product per 100 gallons of spa water to a spa equipped with a BROMITRON Bromine Generator. This will establish sufficient reserve for the bromine generator to operate properly. This same treatment must be followed every 60 days upon draining and refilling the spa with fresh water.	Indoor or outdoor covered spas only (Not for use in swimming pools)

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Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
Swimming pool water systems, hot tubs, spas, fountains continued	Pelleted/Tableted 935-75	Open pour	Maintenance treatment - Add product to the feeder (brominating or chlorinating device). Adjust the feeder to maintain the free available bromine level in the water at 2-6 ppm (mg/L) (1-3 ppm as chlorine) as indicated by a reliable bromine or chlorine test kit. Periodically refill feeding device with enough tablets to assure a constant treatment level of 2-6 ppm (mg/L) available bromine.	Product is intended for use in indoor swimming pools. This product should not be used in outdoor swimming pools. This slow dissolving product is to be used in suitable brominating/chlorinating devices. DO NOT add directly to the swimming pool.

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Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
Swimming pool water systems, hot tubs, spas, fountains continued	Ready-to-use solution 2214-12 3432-58 7364-30 45309-43 10324-95 45337-6 45337-7 45337-8 45337-9 45337-10 45337-11 46043-27 46043-29 69470-31	Open pour	Add 2.0 – 80 oz of product per 5000 gallons of water.	
	Soluble concentrate 2214-13 54998-9	Open pour	Add 3.0 – 60 oz of product per 5000 gallons of water.	

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Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
Swimming pool water systems, hot tubs, spas, fountains continued	Soluble concentrate 5185-448	Open pour	<p>INITIAL TREATMENT: With pump running, add one gallon of liquid or one pound of dry chlorine per 10,000 gallons directly into the water in the deep end of the pool as an initial treatment. Broadcast evenly across the pool surface one pound of this product per 10,000 gallons of water.</p> <p>SUMMER MAINTAINENCE: Add one pound of dry chlorine or one gallon of liquid chlorine plus 6 ounces of this product each week.</p> <p>WINTER MAINTAJNENCE: Add 8 ounces of thy chlorine or one-half gallon of liquid chlorine plus 3 ounces of this product each week.</p>	
	Soluble Concentrate/Solid 58616-5	Open pour	Add 1.5 to 3.0 lb of product per 20,000 gallons of pool water capacity.	
Decorative waters	Ready-to-use Solution 1448-345	Open pour	Product should be applied with chlorine, sodium hypochlorite, or other suitable chlorine donor to provide a residual bromine level of 0.5 ppm.	Do not contain fish

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Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
Medical Premises and Equipment				
Floors, walls, tables, sinks, bathrooms, shower areas, dressing rooms, locker rooms, and other hard, nonporous, inanimate environmental surfaces	Pelleted/Tableted 70369-1	Open pour	<p>Fill one quart spray bottle with room temperature (22°C/72°F) water. Open the foil packets of Tablets A and then B. When effervescing stops and tablets are completely dissolved (about 3 minutes); the disinfectant solution is ready for use. Remove excess organic debris and thoroughly clean surface prior to application of product. Thoroughly spray surfaces to be disinfected, re-spraying as necessary, and allow surfaces to remain wet for 5 minutes. When contact period has concluded, rinse surfaces with potable water or allow surfaces to air dry.</p> <p>Special instructions for cleaning and decontamination against HIV-1 on pre-cleaned environmental surfaces/objects soiled with blood/body fluids:</p> <p>In health care settings or other settings where there is an expected likelihood of soiling inanimate surfaces/ objects with blood or body fluids, and where the surfaces/ objects likely to be soiled with blood or body fluids can be associated with the potential for transmission of human immunodeficiency virus Type 1 (HIV-1) (AIDS Virus) the following special procedures must be used. Personal protection: Wear protective equipment, including disposable latex or rubber gloves, gowns, masks, and eye coverings. Cleaning procedure: Blood or other body fluids must be thoroughly cleaned from the soiled surfaces and objects before product can be applied. Contact time: To kill HIV-1 (AIDS Virus), a contact time of 5 minutes at room temperature. Disposal of infectious materials: Blood and other body fluids should be autoclaved and disposed of according to local regulations for infectious waste disposal.</p>	See Special Instructions in preceding column

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Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
Non-porous dental impression materials	Pelleted/Tableted 70369-1	Open pour	Fill one quart spray bottle with room temperature (22°C/72°F) water. Open the foil packets of Tablets A and then B When effervescing stops and tablets are completely dissolved (about 3 minutes); the disinfectant solution is ready for use. Upon removal of impression from mouth, remove gross debris from impression by rinsing thoroughly with running water. Using a suitable container, immerse impression for 5 minutes in solution. After 5 minutes, remove impression and rinse thoroughly with running water.	
Instrument soak	Pelleted/Tableted 70369-1	Open pour	Fill one quart spray bottle with room temperature (22°C/72°F) water. Open the foil packets of Tablets A and then B When effervescing stops and tablets are completely dissolved (about 3 minutes); the disinfectant solution is ready for use. Place instruments in suitable container filled with solution. Instruments must be completely immersed in solution for 5 minutes. Upon removal, rinse with running water and proceed with final cleaning and terminal sterilization procedures.	
Ultrasonic cleaning equipment	Pelleted/Tableted 70369-1	Open pour	Fill one quart spray bottle with room temperature (22°C/72°F) water. Open the foil packets of Tablets A and then B When effervescing stops and tablets are completely dissolved (about 3 minutes); the disinfectant solution is ready for use. Place items to be cleaned in ultrasonic bath containing solution ensuring that items are fully immersed in solution. Run ultrasonic unit for 5 minutes. Remove items and rinse thoroughly under running water and proceed with terminal sterilization procedures.	Open pour

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Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
Food Handling/ Storage Establishments Premises and Equipment				
Fruit and vegetable wash	Ready-to-Use Solution 1448-345	Open pour	Apply sufficient product and chlorine or sodium hypochlorite to achieve a residual bromine level of 0.5 to 5 ppm when measured approximately 5 minutes after treatment.	The use of this product under this application must be followed by a potable water rinse to remove, to the extent possible, residues of the chemical.
	Ready-to-Use Solution 1706-181	Open pour	Add product to the system at a 0.125 to 1.0 sodium bromide/oxidant mole ratio. This product is applied to a flume water side stream.	Sugar beets must undergo a potable water rinse before slicing.
	Soluble concentrate 5185-448 5185-451 83451-17	Open pour	This product and oxidant should be added at a rate to not to exceed a dosage of 55 ppm of this product (189 pounds/38.5 gallons per one million gallons of water treated).	
Industrial Pasteurizers	Formulation Intermediate 5785-67	Open pour	MUP	
	Technical Chemical 5785-78	Open pour	MUP	

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Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
Industrial Pasteurizers continued	Ready-to-Use Solution 1706-179 3377-74 58616-1	Open pour	Add 3.5 -7.0 ounces of product per 1000 gallons of system water to achieve control.	
	Soluble concentrate 63838-3 63838-5 84024-1	Open pour	Apply product to the cooling water to provide a total bromine level of 1.0-9 ppm.	
Brewery pasteurizers	Ready-to-use solution 3876-158 3876-159 5185-450 5185-466 5785-66 5785-76 5785-79 5785-80 74655-19	Open pour	INITIAL DOSE: Add 0.0001 to 0.24 gallon of product per 1,000 gallons of water contained in the system and oxidize with either gas chlorine (0.008 to 0.08 lb. gas chlorine per 1000 gallons of contained water), or sodium hypochlorite solution (0.006 to 0.07 gallons of 12.5% sodium hypochlorite solution per 1,000 gallons of contained volume). SUBSEQUENT DOSE: Add 0.0001 to 0.082 gallon of this product per 1,000 gallons of water contained in the system, and oxidize with either gas chlorine (0.004 to 0.08 lb. gas chlorine per 1,000 gallons of contained water), or sodium hypochlorite solution (0.003 to 0.07 gallons of 12.5% sodium hypochlorite solution per 1,000 gallons contained volume).	

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Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
Brewery pasteurizers continued	Soluble concentrate 5185-451 5185-467 83451-17 83451-18 83451-19	Open pour	Initial Dose: Add 0.0003 to 0.022 gallons of this product per 1000 gallons of water contained in the system and oxidize with either gas chlorine (0.008 to 0.042 pounds gas chlorine per 1000 gallons of contained water), or sodium hypochlorite solution (0.007 to 0.034 gallons of 12.5% sodium hypochlorite solution per 1000 gallons of contained water). Subsequent Dose: Add 0.00014 to 0.022 gallons of this product per 1000 gallons of water contained in the system and oxidize with either gas chlorine (0.004 to 0.044 pounds gas chlorine per 1000 gallons of contained water), or sodium hypochlorite solution (0.003 to 0.034 gallons of 12.5% sodium hypochlorite solution per 1000 gallons of contained water).	
	Soluble concentrate 15300-26	Open pour	Initial Dose: Apply product and chlorine or sodium hypochlorite to achieve a residual bromine level of 0.5 - 1 ppm or as needed to maintain control. Subsequent Dose: Apply product and chlorine or sodium hypochlorite to achieve a residual bromine level of 0.5 - 1 ppm or as needed to maintain control.	
	Soluble concentrate/Solid 58616-5	Open pour	Apply product to the cooling water to provide a total bromine level of 0.5 to 5.0 ppm	
Commercial, Institutional and Industrial Premises and Equipment				
Decorative waters, fountains	Ready-to-Use Solution 1448-345 1706-179 3377-74	Open pour	Product should be applied with chlorine, sodium hypochlorite, or other suitable chlorine donor to provide a residual bromine level of 0.5 – 9.0 ppm.	Do not contain fish

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Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
Decorative waters, fountains continued	Soluble concentrate 5185-448	Open pour	Add this product to the system at a 0.125 to 2.0 sodium bromide oxidant mole ratio. Add sufficient amount of this product and oxidize with either gas chlorine or sodium hypochlorite solution to achieve a residual bromine level of up to 5 ppm or as needed to maintain control of the system	
	Soluble concentrate 63838-3 63838-5 84024-1	Open pour	Add product to maintain a total bromine level of 1.0-9.0 ppm in all parts of the reservoir or pond.	
Cooling ponds, reservoirs	Ready-to-Use Solution 1706-179 3377-74	Open pour	Apply at the pond inlet or at a location that permits complete diffusion into the water at maximum retention time before reaching the outlet. Sufficient product should be fed to maintain a total bromine level of 4.5-9.0 ppm in all parts of the pond.	Not currently authorized in New York
	Soluble concentrate 63838-3 63838-5 84024-1	Open pour	Add product to maintain a total bromine level of 1.0-9.0 ppm in all parts of the reservoir or pond.	
Recirculating water systems	Ready-to-use solution 1706-179	Open pour	Apply to the cooling water to provide a total bromine level of 4.5-9.0 ppm. Some systems may be maintained in satisfactory biological condition by applying this dosage once per day while others will respond better to dosages less than once per day.	
Commercial air conditioner/refrigeration condensate and dehumidifier basins or drip pans	Soluble concentrate 5185-448	Open pour	Add this product to the system at a 0.125 to 2.0 sodium bromide/oxidant mole ratio. Add sufficient amount of this product and oxidize with either gas chlorine or sodium hypochlorite solution to achieve a residual bromine level of up to 5 ppm or as needed to maintain control of the system.	

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Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
Beauty salons, spa salons, barbershops & other hairstyling facilities – brushes, combs, rollers, manicure and other tools	Pelleted/Tableted 70369-1	Open pour	Fill the standard disinfectant jar with 32 ounces of water. Open the foil packets of Tablets A and then B and drop into the jar. After the tablets dissolve (approximately 3 minutes) the disinfectant solution is ready for use. Thoroughly clean & rinse instruments, then immerse instruments completely for (5) minutes at room temperature (22°C/72°F). After immersion remove instruments and rinse thoroughly.	
Salon foot baths	Pelleted/Tableted 70369-1	Open pour	Fill one quart spray bottle with room temperature (22°C/72°F) water. Open the foil packet of Tablets A and then B When effervescing stops and tablets are completely dissolved (about 3 minutes); the disinfectant solution is ready for use. After use drain the water from the foot spa basin or bowl and remove any visible debris. After cleaning, spray all surfaces of the foot spa basin and allow to stand for at least 5 minutes. After five minutes, drain and rinse with clean water.	
	Pelleted/Tableted 75562-1	Open pour	Fill one-quarter (1-125gallons) of capacity of foot spa bath with warm water. Add one tablet product to water and agitate to dissolve One tablet in 1 – 1.25 gallons of water will provide an active bromine concentration of 40 ppm. Circulate the water In the foot spa bath for ten minutes; add water to capacity and use.	

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Use Site	Formulation	Method of Application	Application Rate/ No. of applications	Use Limitations
Whirlpool foot spas, air-jet basins, "Pipe-Less" foot spas, other circulation spas	Pelleted/Tableted 70369-1	Open pour	<p>Make up a liquid disinfectant solution in a basin by adding to 5 gallons of water ten sets each of Tablet A and then Tablet B. After the tablets dissolve (in approximately 3 minutes) turn the unit on and circulate the disinfectant for at least 5 minutes. Drain the basin after the disinfection period is complete and rinse with clean water.</p> <p>For end of day disinfection fill one quart spray bottle with room temperature (22°C/72°F) water. Open the foil packet of Tablets A and then B. When effervescing stops and tablets are completely dissolved (about 3 minutes), the disinfectant solution is ready for use. Spray all surfaces of the removable parts with solution and using a clean brush, scrub these parts with solution. Make up a liquid disinfectant solution in a basin by adding to 5 gallons of water ten sets each of Tablet A and then Tablet B. After the tablets dissolve (in approximately 3 minutes) turn the unit on and circulate the disinfectant for at least 5 minutes. The whirlpool mechanism of the tub must be operating for the entire disinfection period so the piping and internal components that contain hidden bacteria are disinfected. Drain the basin after the disinfection period is complete and rinse with clean water. Rinse basin then air dry.</p>	
Magnesium Chloride				
Weeds in all types of ice plant (newly planted or established). Selective weed control. Kills grasses and broad leaved weeds.	Pressurized Liquid 84396-30	Pressure Sprayer	To kill weeds in all types of ice plant, mix this product with an equal part of water when temperatures are above 65 degrees. If soil is very wet or the temperature is below 65 degrees, mix with one-half part water. Mix or stir lightly. Apply with a pressure sprayer. This product contains a wetting agent for better coverage. Do not apply any water within 4 days. If rain or irrigation occurs within 4 days repeat treatment. Tall, hard grasses may require several treatments. One gallon of this material when mixed with an equal amount of water will treat from 300- 1000 square feet of ice plant, depending on size and amount of weed.	Not for use on plants being grown for sale or other commercial use, or for research purposes. For use on plants intended for aesthetic purposes or climatic modification and being grown in interior plant-scapes, ornamental gardeners or parks, or on golf courses or lawns or grounds.